

Serial No. 10/696,442
Amendment dated September 7, 2005
Reply to final Office Action of June 8, 2005

Amendments to the Claims:

This listing of claims will replace all prior versions and listings of claims in the application.

Listing of Claims:

1. (currently amended) A fuel cell system comprising:
 - (a) a fuel cell having an oxidant inlet; and
 - (b) a filter assembly comprising:
 - (i) an inlet configured to receive a dirty oxidant stream having gas phase contaminants;
 - (ii) a filter element adapted to remove the gas phase contaminants from the dirty oxidant stream received through the inlet, to provide a cleaned oxidant stream; the filter element comprising:
 - (A) a first activated carbon adsorbent material and a second activated carbon adsorbent material different than the first activated carbon adsorbent material; and
 - (B) a cylindrical particulate filter positioned downstream of the adsorbent material; and
 - (iii) an outlet configured for connection to the fuel cell oxidant inlet, through which the cleaned oxidant stream passes to the fuel cell.
 2. (currently amended) The fuel cell system according to claim 1, wherein the first activated carbon adsorbent material and the second activated carbon adsorbent material are selected from the group consisting of activated carbon granules, impregnated carbon granules, and activated carbon fibers ion-exchange resin, ion-exchange fibers, alumina, activated alumina, molecular sieves, and silica.

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3. (currently amended) The fuel cell system according to claim 2, wherein at least one of the first adsorbent material and the second adsorbent material comprises at least one a solid mass of activated carbon adsorbent material.
4. (currently amended) The fuel cell system according to claim 3, wherein the at least one of the first adsorbent material and the second adsorbent material comprises extruded activated carbon.
5. (original) The fuel cell system according to claim 4, wherein the extruded activated carbon has a curved shape.
6. (canceled)
7. (previously presented) The fuel cell system according to claim 2, wherein at least one of the first adsorbent material and the second adsorbent material comprises a shaped adsorbent material.
8. (canceled)
9. (previously presented) The fuel cell system according to claim 1, wherein at least one of the first adsorbent material and the second adsorbent material is configured to remove any of methane, butane, propane, other hydrocarbons, ammonia, oxides of nitrogen, oxides of sulfur, carbon monoxide, and hydrogen sulfide.
10. (original) The fuel cell system according to claim 1, wherein the filter assembly system comprises a hydrophobic layer.
11. (canceled)

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12. (currently amended) A fuel cell system comprising a filter assembly for use with and a fuel cell, the filter assembly comprising:

- (a) at least one inlet configured to receive a dirty gas stream;
- (b) an outlet adapted to be connected in communication with an oxidant inlet of [[a]] the fuel cell;
- (c) a cylindrical particulate filter comprising cellulose media and fine fiber;
- (d) a chemical filter comprising a first carbon adsorbent material and a second carbon adsorbent material different than the first carbon adsorbent material, with the particulate filter positioned downstream of the chemical filter adsorbent material;
- (e) the particulate and chemical filters being configured, in combination, to remove particulate and gas phase contaminates from the dirty gas stream and to provide a cleaned gas stream, suitable for use by [[a]] the fuel cell, to the assembly outlet and thus the oxidant inlet of [[a]] the fuel cell.

13. (currently amended) The filter assembly fuel cell system according to claim 12, wherein the carbon adsorbent material comprises impregnated carbon material.

14. (currently amended) The filter assembly fuel cell system according to claim 12, wherein the carbon adsorbent material comprises extruded activated carbon.

15. (original) The filter assembly according to claim 13, wherein the impregnated carbon material includes an acidic surface constructed and arranged to remove a basic contaminant, the basic contaminant being selected from the group consisting of ammonia, amines, amides, sodium hydroxides, lithium hydroxides, potassium hydroxides, volatile organic bases and nonvolatile organic bases.

16. (original) The filter assembly according to claim 13, wherein the impregnated carbon material includes a basic surface constructed and arranged to remove an acidic contaminant, the acidic contaminant being selected from the group consisting of sulfur oxides,

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nitrogen oxides, hydrogen sulfide, hydrogen chloride, and volatile organic acids and nonvolatile organic acids.

17. (currently amended) A fuel cell system comprising:
 - (a) a fuel cell having an oxidant inlet; and
 - (b) a filter assembly comprising:
 - (i) an inlet configured to receive a dirty oxidant stream having gas phase contaminants;
 - (ii) a filter element adapted to condition the dirty oxidant stream received through the inlet, to provide a cleaned oxidant stream with gas phase contaminants below a predetermined threshold limit; the filter element comprising:
 - (A) a first mass of carbon adsorbent material held together by polymeric material and a second mass of carbon adsorbent material different than the first held together by polymeric material; and
 - (B) a particulate filter downstream of the adsorbent material; and
 - (iii) an outlet configured for connection to the fuel cell oxidant inlet, through which the cleaned oxidant stream passes to the fuel cell.
18. (original) The fuel cell system according to claim 17, wherein the filter element releaseably captures the gas phase contaminants.
19. (original) The fuel cell system according to claim 17, wherein the filter element captures and permanently retains the gas phase contaminants.
20. (previously presented) A method of controlling contaminants within a gas stream to a gas inlet of a fuel cell, the method comprising:
 - (a) providing a filter assembly comprising a particulate filter and a chemical filter comprising a first carbon adsorbent material and a second carbon adsorbent material, the particulate filter being downstream of the chemical filter;

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- (b) passing a dirty gas stream through each of the particulate filter and the chemical filter to remove contaminants from the dirty gas stream to provide a cleaned gas stream; and
- (c) providing the cleaned gas stream to the gas inlet of the fuel cell.

21. (previously presented) The method according to claim 20, wherein the first carbon adsorbent material and the second carbon adsorbent material comprises impregnated carbon absorbent material.

22. (previously presented) The method according to claim 20, wherein the first carbon adsorbent material has an acidic surface constructed and arranged to remove a basic contaminant, the basic contaminant being selected from the group consisting of ammonia, amines, amides, sodium hydroxides, lithium hydroxides, potassium hydroxides, volatile organic bases and nonvolatile organic bases.

23. (previously presented) The method according to claim 20, wherein the second carbon adsorbent material has a basic surface constructed and arranged to remove an acidic contaminant, the acidic contaminant being selected from the group consisting of sulfur oxides, nitrogen oxides, hydrogen sulfide, hydrogen chloride, and volatile organic acids and nonvolatile organic acids.

24. (previously presented) The method according to claim 20, wherein the carbon adsorbent material comprises extruded carbon absorbent material.

25. (previously presented) The fuel cell system according to claim 1, wherein the particulate filter is a HEPA filter.

26. (currently amended) The ~~filter assembly~~ fuel cell system according to claim 12, wherein the particulate filter is a HEPA filter.